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CENTRAL INTELLIGENCE AGENCY

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9 March 1972

MEMORANDUM FOR RECIPIENTS OF NIE 11-8-71

SUBJECT: Cost of Illustrative Soviet Intercontinental Attack
Force Models

1. The attached memorandum presents estimated costs of the alternative force projections in NIE 11-8-71, Soviet Intercontinental Attack Forces. These costs were calculated by the Office of Strategic Research, CIA, in the same manner as the costs presented in Annex I of NIE 11-8-70, and have been noted by the Board of National Estimates as similarly appropriate aggregate measurements of the costs of the projections in NIE 11-8-71.

2. This memorandum is for your information, and is our final action on this subject. We do not intend this year to coordinate these cost estimates within the Intelligence Community or to publish them as an Annex to NIE 11-8-71.

John Huizenga
(me)
JOHN HUIZENGA
Director
National Estimates

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MEMORANDUM FOR THE RECIPIENTS OF NIE 11-8-71

SUBJECT: Cost of Illustrative Soviet Intercontinental
Attack Force Models

Costing Methodology

1. This memorandum presents estimates of Soviet expenditures for each of the illustrative force projections described in Section X of NIE 11-8-71, SOVIET INTERCONTINENTAL ATTACK FORCES, dated 21 October 1971, TOP SECRET, ALL SOURCE. The estimates utilize a direct costing methodology. This approach begins with a detailed projection of the forces summarized in Section X. These forces are then multiplied by estimates of their unit costs. Finally, the results are summed into subtotals and totals using expenditure categories similar to those used by the US Department of Defense.

2. In effect, the costing process amounts to building a Soviet military budget for intercontinental attack systems line item by line item from the base up, using the considerable body of data available on

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Soviet deployment practices and on such factors as manning levels and operating procedures to help determine unit costs. In fact, the work is done twice: once in rubles and once in dollars. The ruble figures represent our estimate of what these forces cost the Soviet Union and are useful in analyzing trends and in comparing costs of different forces or programs as they would appear to Soviet planners and leaders. The dollar figures represent what these forces would cost if procured and operated in the US, and are useful primarily to represent the Soviet level of effort compared to that of the US.

3. In determining ruble costs, we have sufficiently good evidence on pay scales and food and clothing allowances for the Soviet armed forces to calculate the important area of personnel expenditures directly. For most other expenditure items, however, the work begins by establishing the dollar price and then applying a dollar-to-ruble conversion factor to obtain an estimated ruble cost equivalent.

4. Dollar prices are normally based on the cost factors used in pricing analogous US items, as adjusted to reflect the best information available on the physical make-up of Soviet weapon systems and Soviet procedures for operating and maintaining them. Dollar-to-ruble conversion factors are derived by matching known US dollar prices with Soviet ruble prices for similar items (the conversion factor used for Soviet radars, for example, is based on known Soviet and US prices for non-military electronic equipment).

5. Item by item dollar-to-ruble conversions are necessary because no single dollar-to-ruble relationship can accurately reflect the relative purchasing power of the ruble and the dollar across the board for all the different types of resource inputs that make up defense spending. For example, in the USSR it takes only 20 rubles on the average to purchase the same military personnel services that would cost 100 dollars in the US, but about 60 rubles to purchase electronic equipment that would

cost 100 dollars. As the mix of the goods and services purchased by the Soviets changes, the ratio of the overall cost expressed in rubles to that expressed in dollars will also be affected. A ruble expenditure which equates to a certain dollar expenditure in one year (or force) will not necessarily equate to the same dollar expenditure in another year (or force).

6. The expenditure estimates presented here do not include spending for research, development, test, and evaluation (RDT&E). Comprehensive estimates of the RDT&E costs specifically attributable to the intercontinental attack mission are not presently available, although efforts to develop them are being carried out.

7. Expenditures for procurement of equipment and construction of facilities for new weapon systems usually begin some two or three years before the systems become operational. Since the force projections in Section X of NIE 11-8-71 give no basis for estimating pre-deployment costs of weapons which enter service after 1979, the last year of the projections, the costs of the illustrative forces are projected only through 1976.

Expenditure Estimates

8. During the 1960s the Soviets engaged in a vigorous and costly buildup of intercontinental attack forces. Expenditures for these forces are estimated to have grown from about 1.1 billion rubles (\$2.5 billion) in 1961 to 2.8 billion rubles (\$7.1 billion) in 1969, an increase of almost 150 percent (see figure).* Soviet investment spending -- that is,

* *The illustrative non-SALT forces costed in this memorandum are roughly comparable in concept to the forces projected in NIE 11-8-70. Any direct comparison between the costs presented in this memorandum and those presented in Annex I of NIE 11-8-70, however, would be misleading for several reasons:*

- a) *The price bases for both Soviet and US military spending were recently updated. These changes were made to reflect a general revision of prices in the USSR -- the first since 1955 -- and considerable inflation in US costs from 1968 to 1970. The ruble costs of the Soviet forces that appear in this memorandum are thus expressed in constant 1968 rubles and the dollar valuations in constant 1970 dollars, in contrast to Annex I of NIE 11-8-70, which used constant 1955 rubles and constant 1968 dollars.*
- b) *This year's force projections utilize new evidence and judgments, as set forth in the body of NIE 11-8-71. Particularly important in its influence on costing is the assumed introduction of accurate MIRV warheads at a later date than in NIE 11-8-70. This change results in considerable differences in cost ratios between 1970 and 1971 force projections.*
- c) *The time periods covered have changed.*

The net effect of these and lesser changes is, as noted, to render meaningless any direct comparison between these figures and those in Annex I of NIE 11-8-70.

for procurement of equipment and for construction of facilities -- for intercontinental attack forces leveled off in 1969. Although Soviet expenditures for operation and maintenance continued to rise in 1970, reduced procurement and construction spending resulted in an 8 percent decrease in total expenditures.

9. For each of the illustrative Soviet force projections, expenditures continue to decline in 1971 and 1972. This decrease in spending is primarily a reflection of the ending of SS-9, SS-11, and SS-13 deployment. Although all the illustrative forces project some further improvement in ICBM capabilities, this does not show up clearly in the operational numbers and related cost figures before 1973-1974.

Forces Under a SALT Agreement

10. SALT Force 1, which illustrates a likely Soviet effort under an assumed arms limitation agreement, and SALT Force 2, which illustrates a maximum Soviet effort under the same arms limitation agreement, would require average annual expenditures of 1.6 billion

rubles (\$4.6 billion) and 2.2 billion rubles (\$5.3 billion) over the next five years. SALT Force 1 -- developed under the premise that with an arms limitation agreement the Soviets would be concerned primarily with the survivability of their strategic forces and the retention of a strong retaliatory capability against US programmed forces -- would require an average annual expenditure about 75 percent of the 1961-1970 average.

11. In contrast, SALT Force 2, which represents a Soviet attempt to improve counterforce and retaliatory capabilities by an early deployment of MIRVs, would require annual expenditures about equal to the 1961-1970 average. To facilitate cost comparisons with the non-SALT force projections, the two SALT forces do not include the costs of the 120 SS-11 silos and 66 new-type silos at Derazhnya and Pervomaysk -- although those silos would be counted as ICBM launchers under any SALT agreement. For differing agency views as to whether these launchers at Derazhnya and Pervomaysk are primarily intended for peripheral or inter-continental attack, see Annex F and paragraph 255 of

NIE 11-8-71, SOVIET INTERCONTINENTAL ATTACK FORCES.

Inclusion of expenditures related to these silos would increase average annual expenditures by about 0.2 billion rubles (\$0.4 billion) for either SALT forces.

Forces Outside a SALT Agreement

12. Force 1, which illustrates a minimum Soviet posture for deterrence against US programmed forces without an arms limitation agreement, would result in considerable savings compared with Soviet expenditures during recent years. Over the period 1971-1976, Force 1 would require an average annual expenditure of about 1.3 billion rubles (\$3.8 billion) -- only about 60 percent of the 1961-1970 average, with expenditures falling throughout the period. The reduced level of spending for this force arises from the fact that it assumes deactivation of most of the older ICBMs and only modest force improvements incorporating comparatively little technical advance.

13. Force 2 is a set of three illustrative forces that are intended to represent the most likely way the

Soviets could maintain strong retaliatory capabilities against a range of US threats. Forces 2A and 2B assume the Soviets are successful in developing MIRVs at an early date, although in force 2B the accuracy of the new system is no improvement over the accuracy of current missile systems. Each of these forces would require an average yearly expenditure of around 1.8 billion rubles (\$4.9 billion) -- about 85 percent of the 1961-1970 average. Expenditures for both of these forces would decline throughout the period largely because the postulated introduction of MIRVs would permit the Soviets to reduce investment in new launchers and missiles. In contrast, Force 2C assumes that the Soviets do not develop MIRVs for several years but instead follow the more expensive path of deploying additional ICBM and SLBM launchers. Force 2C would require average annual expenditures close to the 1961-1970 average of around 2.1 billion rubles (\$5.7 billion) per year.

14. Force 3, which illustrates the type of effort the Soviets would have to undertake if they place top

priority on acquiring a capability to destroy more than 90 percent of the existing US ICBM force, would require average annual expenditures about equal to the 1961-1970 average of around 2.2 billion rubles (\$5.7 billion) per year. While it approximates the total for Force 2C, the increased cost of Force 3 over Forces 2A and 2B results primarily from additional ICBM deployment and the rapid introduction of MIRVs in the ICBM force. As Section X notes, a logical corollary to the expansion of intercontinental attack forces postulated under this force would be a substantial buildup of Soviet strategic defense forces. Such a buildup -- on the order of Model IV in NIE 11-3-71, SOVIET STRATEGIC DEFENSES, dated 25 February 1971, TOP SECRET, ALL SOURCE.-- would add considerably to the overall cost implications of this force option.

15. Force 4, which illustrates what we believe would be a maximum Soviet effort, would require average annual expenditures more than 50 percent greater than the 1961-1970 average. The average annual expenditure of 3.4 billion rubles (\$7.8 billion)

over the period 1971-1976 necessary for this force exceeds Soviet expenditures for intercontinental attack forces in any previous year. With the simultaneous deployment of additional ICBMs and SLBMs at about the highest sustained rate ever achieved in the past and rapid technological progress for all systems, Force 4 represents what we believe to be a maximum peacetime resource allocation to intercontinental attack forces -- annual expenditures in 1975 and 1976 would reach the 4.8 billion ruble (\$10 billion) mark. As Section X of NIE 11-8-71 notes, a logical corollary to the expansion of intercontinental attack forces postulated under Force 4 -- as was noted for Force 3 -- would be a substantial buildup of Soviet strategic defense forces. Such a buildup -- on the order of Model IV in NIE 11-3-71 -- would add considerably to the overall cost implications of this force option also.

Validity of the Estimates of Expenditures

16. The validity of these estimates of expenditures depends on the reliability of the underlying

estimates of the size and composition of the forces being costed and on the accuracy of the cost factors applied to those data. The physical data base reflects the combined collection and analytical efforts of the Intelligence Community; its adequacy is discussed in the earlier portion of Section X of NIE 11-8-71.

Many of the cost factors can necessarily be derived only from analogous US data and experience and dollar/ruble conversions. When they could be checked, they have proven to be reasonably accurate. The expenditure estimates for the historical period are believed to be accurate as to trend and level. Projections of force levels and of costs of new systems are more uncertain, and this uncertainty increases as the time period for the projections is extended.

17. We believe that the ranking of the illustrative force postures according to total spending levels is valid. We are also confident that the estimated spending for any element -- e.g., ICBMs -- of a given force projection can be usefully compared with the estimated spending on the same element in other illustrative projections. The projected direction

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and rate of change in spending for each of the postures are probably close to the mark. We are much less certain about absolute levels of spending.

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TABLE I

Estimated Soviet Expenditures
Illustrative Soviet Intercontinental Attack Force Models

SALT FORCES

	Annual Average <u>1961-70</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	Billions of 1968 Rubles*		Annual Average <u>1971-76</u>
							<u>1976</u>	Cumulative <u>1971-1976</u>	
SALT									
Force 1									
ICBMs	1.6	1.2	0.7	0.9	1.1	1.2	1.2	6.3	1.0
SLBMs	0.3	0.6	0.5	0.2	0.3	0.4	0.5	2.5	0.4
Bombers	<u>0.2</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.8</u>	<u>0.1</u>
Total**	2.1	2.0 (2.2)	1.3 (1.6)	1.3 (1.6)	1.5 (1.7)	1.7 (1.8)	1.8 (1.9)	9.6 (10.8)	1.6 (1.8)
SALT									
Force 2									
ICBMs	1.6	1.2	0.8	1.2	1.6	1.9	2.0	8.8	1.5
SLBMs	0.3	0.6	0.4	0.3	0.5	0.9	1.0	3.7	0.6
Bombers	<u>0.2</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.8</u>	<u>0.1</u>
Total**	2.1	2.0 (2.2)	1.4 (1.6)	1.6 (1.9)	2.3 (2.5)	3.0 (3.1)	3.1 (3.2)	13.3 (14.5)	2.2 (2.4)

* Because of rounding components may not add to the totals shown. The ruble values are expressed in constant 1968 prices so that only changes in the underlying programs will cause changes in the levels of spending. They cannot with any validity be directly compared to expenditures expressed in constant 1966 prices in Annex I of NIE 11-8-70.

** Data in parentheses include expenditures for 120 SS-11 silos and 66 new-type silos at Derazhnya and Pervomaysk. See paragraph 11, page 7 of this annex.

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TABLE I (continued)

	NON-SALT FORCES						Billions of 1968 Rubles*		
	Annual Average 1961-70	1971	1972	1973	1974	1975	1976	Cumulative 1971-1976	Annual Average 1971-76
Force 1									
ICBMs	1.6	1.2	0.8	0.9	0.9	0.6	0.6	5.0	0.8
SLBMs	0.3	0.6	0.5	0.3	0.2	0.1	0.1	1.8	0.3
Bombers	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.8	0.1
Total	2.1	2.0	1.4	1.3	1.1	0.8	0.8	7.6	1.3
Force 2A**									
ICBMs	1.6	1.2	0.9	1.2	1.3	1.1	1.0	6.7	1.4
SLBMs	0.3	0.6	0.6	0.5	0.4	0.4	0.5	3.2	0.6
Bombers	0.2	0.1	(0.5)	(0.5)	(0.3)	(0.2)	(0.2)	(2.8)	(0.5)
Total	2.1	2.0	1.7	1.9	1.9	1.7	1.6	10.7	1.8
			(1.5)		(2.0)	(1.6)	(1.3)	(10.3)	(1.7)
Force 2B**									
ICBMs	1.6	1.1	0.8	1.2	1.3	1.1	1.2	6.8	1.1
SLBMs	0.3	0.6	0.6	0.5	0.4	0.4	0.5	3.2	0.5
Bombers	0.2	0.1	(0.5)	(0.5)	(0.3)	(0.2)	(0.2)	(2.8)	0.1
Total	2.1	1.9	1.6	1.8	1.9	1.7	1.8	10.8	1.8
			(1.5)		(2.0)	(1.6)	(1.5)	(10.3)	(1.7)
Force 2C**									
ICBMs	1.6	1.2	0.8	1.1	1.5	1.9	1.6	8.2	1.4
SLBMs	0.3	0.6	0.6	0.7	0.7	0.5	0.6	3.7	0.6
Bombers	0.2	0.1	(0.5)	(0.4)		(0.6)	(0.5)	(3.3)	(0.5)
Total	2.1	2.0	1.6	1.9	2.3	2.6	2.3	12.6	2.1
			(1.5)	(1.7)	(2.4)		(2.2)	(12.3)	(2.0)
Force 3**									
ICBMs	1.6	1.1	0.8	1.3	1.7	2.0	2.1	9.0	1.5
SLBMs	0.3	0.6	0.6	0.5	0.4	0.4	0.5	3.2	0.5
Bombers	0.2	0.1	(0.5)	(0.5)			(0.2)	(2.8)	
Total	2.1	1.9	1.5	2.0	2.3	2.6	2.7	13.0	2.2
			(1.4)	(1.9)	(2.4)	(2.5)	(2.4)	(12.6)	(2.1)
Force 4									
ICBMs	1.6	1.3	1.2	2.0	3.0	3.7	3.9	15.1	2.5
SLBMs	0.3	0.7	0.6	0.5	0.9	1.0	0.8	4.4	0.7
Bombers	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.8	0.1
Total	2.1	2.1	1.9	2.6	4.0	4.8	4.8	20.2	3.4

* See previous page.

** For Forces 2A, 2B, 2C, and 3 there are alternative projections involving differences in SLBM forces. Where there are differences in expenditures for the two alternative forces, Alternate 2 is shown in parentheses.

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TABLE II
Dollar Valuation of
Illustrative Soviet Intercontinental Attack Force Models

SALT FORCES

	Annual Average 1961-70	1971	1972	1973	1974	1975	Billions of 1970 Dollars*		
							1976	Cumulative 1971-1976	Annual Average 1971-76
SALT Force 1									
ICBMs	3.7	3.4	2.5	2.9	3.1	3.4	3.4	18.7	3.1
SLBMs	0.8	1.8	1.4	0.6	0.7	0.9	1.2	6.6	1.1
Bombers	0.5	0.4	0.4	0.4	0.3	0.3	0.3	2.1	0.4
Total**	5.0	5.7 (6.1)	4.2 (4.7)	3.9 (4.5)	4.1 (4.6)	4.6 (4.9)	4.9 (5.1)	27.5 (29.9)	4.6 (5.0)
SALT Force 2									
ICBMs	3.7	3.4	2.6	3.2	3.8	4.4	4.5	21.9	3.7
SLBMs	0.8	1.9	1.2	0.6	1.0	1.5	1.7	7.9	1.3
Bombers	0.5	0.4	0.4	0.4	0.4	0.4	0.4	2.3	0.4
Total**	5.0	5.7 (6.1)	4.2 (4.6)	4.2 (4.8)	5.2 (5.7)	6.2 (6.5)	6.6 (6.8)	32.1 (34.5)	5.3 (5.8)

* Because of rounding components may not add to the totals shown. The dollar values are expressed in constant 1970 prices so that only changes in the underlying programs will cause changes in the levels of spending. They cannot with any validity be directly compared to expenditures expressed in 1968 dollars in Annex I of NIE 11-8-70

** Data in parentheses include expenditures for 120 SS-11 silos and 66 new-type silos at Derazhnya and Pervomaysk. See paragraph 11 page 7 of this annex.

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TABLE II (continued)

	NON-SALT FORCES						Billions of 1970 Dollars		
	Annual Average 1961-70	1971	1972	1973	1974	1975	1976	Cumulative 1971-1976	Annual Average 1971-76
Force 1									
ICBMs	3.7	3.4	2.7	2.9	2.6	2.0	1.9	15.4	2.6
SLBMs	0.8	1.9	1.4	0.7	0.4	0.3	0.3	5.1	0.8
Bombers	0.5	0.4	0.4	0.4	0.3	0.3	0.3	2.1	0.4
Total	5.0	5.6	4.4	4.0	3.4	2.7	2.5	22.7	3.8
Force 2A**									
ICBMs	3.7	3.5	2.8	3.4	3.5	3.0	2.6	18.8	3.1
SLBMs	0.8	1.9	1.9	1.5	1.0	1.0	1.3	8.6	1.4
Bombers	0.5	0.4	(1.4)	(1.4)	(1.5)	(0.9)	(0.6)	(7.8)	(1.3)
Total	5.0	5.7	0.4	0.4	0.3	0.3	0.3	2.1	0.4
			5.1	5.3	4.9	4.3	4.2	29.5	4.9
			(4.7)	(5.2)	(5.4)	(4.2)	(3.5)	(28.7)	(4.8)
Force 2B**									
ICBMs	3.7	3.3	2.7	3.3	3.5	3.0	2.9	18.8	3.1
SLBMs	0.8	1.9	1.9	1.5	1.1	1.0	1.3	8.6	1.4
Bombers	0.5	0.4	(1.4)	(1.4)	(1.5)	(0.9)	(0.6)	(7.7)	(1.3)
Total	5.0	5.6	0.4	0.4	0.3	0.3	0.3	2.1	0.4
			5.0	5.2	5.0	4.3	4.5	29.5	4.9
			(4.5)	(5.1)	(5.4)	(4.2)	(3.8)	(28.6)	(4.2)
Force 2C**									
ICBMs	3.7	3.4	2.6	3.3	4.0	4.6	4.0	21.9	3.7
SLBMs	0.8	1.9	1.9	1.9	1.8	1.4	1.3	10.2	1.7
Bombers	0.5	0.4	(1.5)	(1.3)	(2.0)	(1.8)	(1.2)	(9.6)	(1.6)
Total	5.0	5.7	0.4	0.4	0.3	0.3	0.3	2.1	0.4
			4.9	5.6	6.1	6.3	5.6	34.2	5.7
			(4.5)	(4.9)	(6.3)	(6.8)		(33.7)	(5.6)
Force 3**									
ICBMs	3.7	3.3	2.6	3.6	4.2	4.8	4.8	23.3	3.9
SLBMs	0.8	1.9	1.9	1.5	1.0	1.0	1.3	8.6	1.4
Bombers	0.5	0.4	(1.4)	(1.4)	(1.5)	(0.9)	(0.6)	(7.8)	(1.3)
Total	5.0	5.5	0.4	0.4	0.3	0.3	0.3	2.1	0.4
			4.9	5.4	5.6	6.2	6.4	34.0	5.7
			(4.4)		(6.1)	(6.1)	(5.8)	(33.2)	(5.5)
Force 4									
ICBMs	3.7	3.5	3.3	4.8	6.4	7.8	8.1	34.0	5.7
SLBMs	0.8	1.9	1.5	1.3	2.3	2.2	1.6	10.8	1.8
Bombers	0.5	0.4	0.4	0.4	0.4	0.4	0.4	2.3	0.4
Total	5.0	5.8	5.2	6.5	9.1	10.4	10.1	47.1	7.8

* See previous page.

** For Forces 2A, 2B, 2C, and 3 there are alternative projections involving differences in SLBM forces. Where there are differences in expenditures for the two alternative forces, Alternate 2 is shown in parentheses.